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NOTE ON THE FAUNA OF *DROSOPHILA* (DIPTERA: DROSOPHILIDAE) AND THE FIRST RECORD OF *OPOMYZA FLORUM* (DIPTERA: OPOMYZIDAE) FROM MT. GOČ, SERBIA

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Abstract

Fauna of Drosophilidae in Serbia has been studied for 40 years. This paper presents the results of faunistic research conducted on Mt. Goč in June 2011 in two forests (beech and oak), which are significantly different in the type of vegetation and microclimatic factors. In the oak forest eight species of *Drosophila* were registered, while in the beech forest only five species were recorded. A relatively small number of species recorded is, among other things, the result of extremely bad weather conditions during the collection attempts. An interesting non-drosophilid fly was also found in the sample - *Opomyza florum* Fabricius, 1794 (Diptera: Opomyzidae). Since there is very little data concerning the distribution of *O. florum* in Serbia, this paper is an invitation to entomologists to further study this species, including faunistical, ecological and behavioral aspects, keeping in mind its potential economic impact.

KEY WORDS: *Drosophila*, *Opomyza florum*, Serbia

Introduction

Numerous studies regarding biodiversity, temporal and spatial distribution of Drosophilidae in former Yugoslavia have been conducted in the past forty years, at more than 60 localities. This region is climatically and biogeographically extremely versatile and faunistically very rich when considering Drosophilidae (a total of 59 species classified into 9 genera were found, KEKIĆ *et al*., 1999a; KEKIĆ, 2002). During this period, different localities in Serbia were faunistically investigated (KEKIĆ *et al*., 1999a; KEKIĆ, 2002, 2009). Some

parts of Serbia were very well explored, like Vojvodina and regions along the Danube River (KEKIĆ *et al.*, 1995; KEKIĆ *et al*., 1996; KEKIĆ *et al.*, 1999; KEKIĆ, 2009; PAVKOVIĆ-LUČIĆ & KEKIĆ, 1998, 1998a). Other parts of the country, like central (STANIĆ *et al.*, 2002) and western Serbia (PAVKOVIĆ-LUČIĆ *et al*., 2009), are at the onset of faunistic exploring, while the southern part was poorly investigated.

Material and Methods

This is the report of the preliminary results of faunistic study of Drosophilidae, conducted at Mt. Goč, Serbia. The flies were collected on the east side of Goč Mountain, at Gvozdac, situated between 43°33'–43°35' N and 18°15'–18°40' E in central Serbia. Local samples were taken from two forest communities (air-distance between these two localities is approximately 6.9 km), in beech forest (*Abieto-fagetum,* at an altitude 875 m, designated as BF) and oak forest (*Fraxineto-quercetum,* at an altitude of 787 m, designated as OF). Differences in topography and soil composition, as well as distribution of dominant trees within beech and oak forests considerably modify the microclimate (GAJIĆ, 1984). Beech forest has more stable environmental factors which are reflected in high humidity, with dense vegetation coverage and feeble daylight. In contrast, oak forest has changeable environmental factors during the day. It is slightly warmer with lower humidity, has sparse trees and therefore robust daylight. Significant differences in thermal regimes, light and humidity between those habitats were also previously observed and discussed (SAVKOVIĆ *et al*., 2004).

Both populations were sampled simultaneously at the end of June (June 29th and 30th, 2011), by baits, using fermenting apples. Fermented substrate was homogenously mixed and prepared one day before using, by adding baker's yeast to accelerate the fermentation process to attract flies.

Ten traps were set 10m apart in a square formation in the oak wood, and in rectangular formation in the beech wood. The area covered by traps was thus 400 m^2 in each habitat. If 30 m are added in each direction, with regard to the dispersion of *Drosophila subobscura*, the total area of the study site was 7000 m^2 (BEGON, 1976; LOUKAS & KRIMBAS, 1979).

Flies were swept with a net in the late afternoon peak of activity (from 4.00 PM up to 7.30 PM). They were not collected during morning hours, as the second significant period of activity, because of very bad weather conditions for this part of the year. The temperature in the morning was below 10 °C and relative humidity was over 90% accompanied with constant rain. An average temperature of 15.3 °C and mean humidity of 90.8% were recorded in the afternoon for each locality (15.15 °C in beech and 15.44 °C in oak forest).

The identification of "dark" flies was performed on fresh material. Immediately after capturing, flies were etherized and examined under binocular microscope. Those flies were kept alive for future laboratory work. "Yellow" flies were put into separate vials (*per* day and *per* locality of collecting) filled with 70% ethanol and identified later for faunistic purpose. Identification and classification were based on keys to Drosophilidae genera and species (BÄCHLI & BURLA, 1985; BÄCHLI *et al.*, 2004; MÁCA, 2006; BÄCHLI, 2008; KEKIĆ, 2009).

Results and Discussion

A total of 8 species from the genus *Drosophila* were recorded. The OF habitat was numerous according to the number of species (8 species) in comparison with the BF habitat where 5 species were observed (Tab. I).

Table I. List of *Drosophila* species recorded on Mt. Goč, Serbia. Abbreviations: BF – beech forest; OF – oak forest; "+" present in collection, "-" absent in collection.

Genus	Subgenus	Species group	Species	BF	OF
Drosophila	*Drosophila*	*Drosophila quinaria*	*kuntzei* Duda, 1924	+	+
			phalerata Meigen, 1830	-	+
			transversa Fallén, 1823	+	+
		Drosophila histrio	*histrio* Meigen, 1830	-	+
		Drosophila immigrans	*immigrans* Sturtevant, 1921	-	+
	Sophophora	*Drosophila obscura*	*subobscura* Collin, 1936	+	+
			obscura Fallén, 1823	+	+
			ambigua Pomini, 1940	+	+

Among "dark" flies, the ecologically versatile and typically woodland species *D. subobscura* was dominant in the collection. This species was previously recognized as a dominant species in wild habitats in Serbia, and was very numerous also in semidomestic ones (KEKIĆ, 2002). Besides *D. subobscura*, only a few *D. obscura* and *D. ambigua* specimens were recorded in the collection of "dark" flies. "Yellow" flies were represented by 5 *Drosophila* species, 3 of them belonging to the *quinaria* group (*D. kuntzei, D. phalerata* and *D. transversa*), then *D. histrio* and *D. immigrans*. The most abundant were representatives of the *quinaria* group of species.

There are several factors which may explain the greater number of Drosophilidae species inhabiting Mt. Goč:

1. Some other species of the genus *Drosophila*, as well as of some other genera of the family Drosophilidae were recorded in faunistic research conducted almost 30 years ago on Mt. Goč. During that investigation, a total of 23 species were found (19 from the genus *Drosophila*, 2 from the genus *Scaptomyza* and one from the genera *Leucophenga* and *Stegana,* BÄCHLI & KEKIĆ, 1983).
2. The geographically nearest region in which flies were previously collected is the city of Kragujevac where a higher number of species was also recorded. Moreover, as could be expected, species associated with antropogenic activities were also observed (STANIĆ *et al*., 2002).
3. The small number of recorded species mostly results from extremely bad weather conditions (unusual for the end of June in Serbia). Some species may be inactive in those conditions, or may change the time of their activities. Many species are mostly active during morning and evening hours, when most matings take place. However, in altered environmental conditions they could make some shifts in daily activities (just one week before our field sampling the temperature was very high, up to 30 °C). It was previously noted that the differentiation among microhabitats may exist within the studied area because of weather or other temporal changes, and the differences in species composition may vary between clear and dry versus cold days (see TAYLOR, 1987).
4. There are four main categories of European Drosophilidae, made according to the different substrates they used: fermenting fruits, sap fluxes, fungi and decaying materials such as leaves, stems, and roots (CARSON, 1971; SHORROCKS, 1982; KEKIĆ, 2009). In this study, only fermenting apples were used for attracting flies. Using more substrates in faunistic research probably would attract more species.

5. Since the daily activity rhythm may differ among habitats both spatially and temporally, faunistic research during different seasons also may yield additional species to the faunistic list.
6. The methodology of collecting flies can influence, to a great extent, the composition of the species within a given habitat (KEKIĆ, 2002; BÄCHLI, *pers. comm*.), i. e. species may be differentially attracted by various methods. Additional ways of capturing flies may contribute to the number of species recorded in given habitat.

Figure 1. *Opomyza florum* Fabricius, 1794 (photographed with AxioCam MRc camera attached to Stemi 2000C).

In that respect, the expansion of research will confirm the presence of a larger number of Drosophilidae species on Goč Mountain. More species could be found in different environmental conditions, at different time points and by different ways of collecting, which would be the aim for further faunistic and ecological studies of Drosophilidae fauna in this area.

Finally, it is important to note that among flies collected in oak forest specimen of the yellow cereal fly *Opomyza florum* Fabricius 1794 (Diptera: Opomyzidae) was found (Figure 1). This species is a cereal pest, distributed all over Europe (http://www.agroatlas.ru/pests/Opomyza_florum_en.htm). It was previously recorded in Serbia and papers considering wheat and barley resistance to *O. florum* were published (STAMENKOVIĆ, 1980, 1986, 1991). During the 1980's and early 1990's, this species caused considerable damage to crops sown early (STAMENKOVIĆ, 2000), while during past years it is not among significant crop pests because of low abundance (STAMENKOVIĆ, 2000; SPASIĆ, *pers. comm.*). It occurred in wheat fields in Vojvodina and much less in the central part of the country (STAMENKOVIĆ, 2000). Larvae of *O. florum* were also found in plants in east Serbia, in the vicinity of Zaječar (SPASIĆ, *pers. comm.*). However, precise faunistic and ecological data considering this economically important species in Serbia are lacking. For these reasons, we call for entomologists, especially dipterologists, to explore this crop pest in this area. Information regarding the general biology, distribution, ecology and behaviour of this dipteran species certainly has not only theoretical, but also practical value in applied entomological research.

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БЕЛЕШКА О ФАУНИ *DROSOPHILA* (DIPTERA: DROSOPHILIDAE) И ПРВИ НАЛАЗ ВРСТЕ *OPOMYZA FLORUM* (DIPTERA: OPOMYZIDAE) НА ПЛАНИНИ ГОЧ, СРБИЈА

СОФИЈА ПАВКОВИЋ-ЛУЧИЋ, ТАТЈАНА САВИЋ, МИХАИЛО ЈЕЛИЋ, БОЈАН КЕНИГ, МАРИЈА ТАНАСКОВИЋ, МАРИНА СТАМЕНКОВИЋ-РАДАК И МАРКО АНЂЕЛКОВИЋ

Извод

Фауна Drosophilidae се у Србији изучава већ 40 година. У овом раду су приказани резултати фаунистичког истраживања спроведеног на Гочу у јуну 2011. године, у две шуме (буковој и храстовој), које се знатно разликују у типу вегетације и микроклиматским факторима. У храстовој шуми је регистровано 8 врста *Drosophila,* а у буковој 5 врста. Релативно мали број регистрованих врста је, између осталог, последица екстремно лоших временских услова током сакупљања мушица. У узорку сакупљених мува утврђено је и присуство жуте житне муве, *Opomyza florum* Fabricius 1794 (Diptera: Opomyzidae). Имајући у виду да постоји врло мало података који се тичу дистрибуције *O. florum* у Србији, овај рад је и позив ентомолозима у смислу даљег изучавања ове врсте, са фаунистичког, еколошког и аспекта понашања, с обзиром на њен потенцијални економски значај.

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